# 2

# Declaring PL/SQL Variables

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# Objectives

After completing this lesson, you should be able to do the following:

- Recognize valid and invalid identifiers
- List the uses of variables
- Declare and initialize variables
- List and describe various data types
- Identify the benefits of using the `%TYPE` attribute
- Declare, use, and print bind variables

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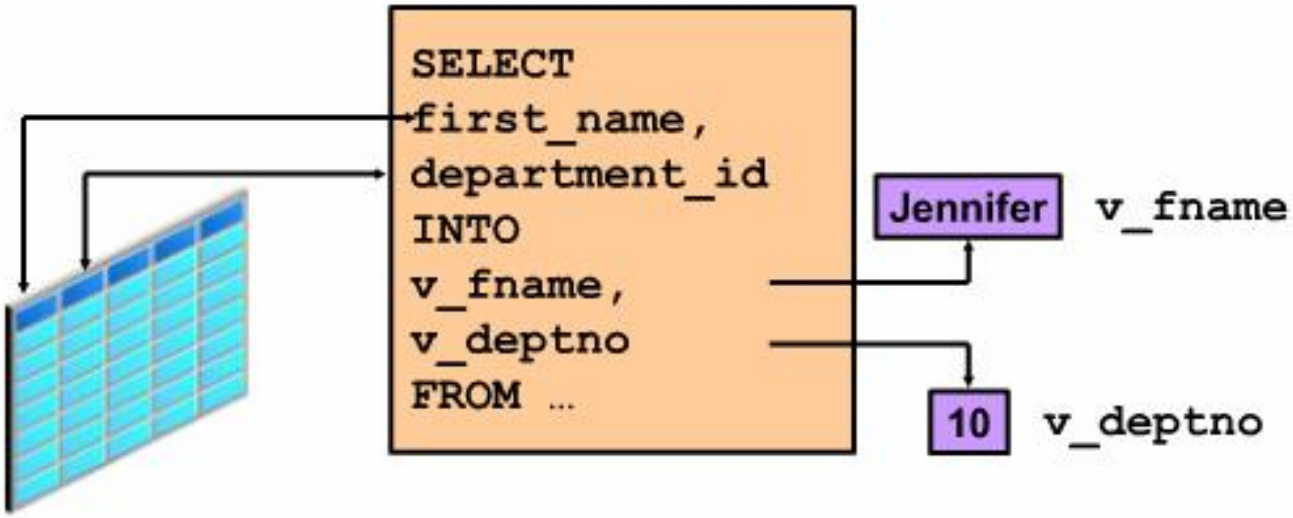
# Use of Variables

Variables can be used for:

- Temporary storage of data
- Manipulation of stored values
- Reusability



# Requirements for Variable Names

A variable name:

- Must start with a letter
- Can include letters or numbers
- Can include special characters (such as `$`, `_`, and `#` )
- Must contain no more than 30 characters
- Must not include reserved words

# Handling Variables in PL/SQL

Variables are:

- Declared and initialized in the declarative section
- Used and assigned new values in the executable section
- Passed as parameters to PL/SQL subprograms
- Used to hold the output of a PL/SQL subprogram

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# Declaring and Initializing PL/SQL Variables

Syntax:

```
identifier [CONSTANT] datatype [NOT NULL]
     [:= | DEFAULT expr];
```

Examples:

```
DECLARE
  v_hiredate      DATE;
  v_deptno        NUMBER(2) NOT NULL := 10;
  v_location      VARCHAR2(13) := 'Atlanta';
  c_comm          CONSTANT NUMBER := 1400;
```

# Declaring and Initializing PL/SQL Variables

1

```
DECLARE
  v_myName VARCHAR2(20);
BEGIN
 DBMS_OUTPUT.PUT_LINE('My name is: '|| v_myName);
 v_myName := 'John';
 DBMS_OUTPUT.PUT_LINE('My name is: '|| v_myName);
END;
/
```

2

```
DECLARE
 v_myName VARCHAR2(20):= 'John';
BEGIN
 v_myName := 'Steven';
 DBMS_OUTPUT.PUT_LINE('My name is: '|| v_myName);
END;
/
```

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# Delimiters in String Literals

```
DECLARE
    v_event VARCHAR2(15);
BEGIN
   v_event  := q'!Father's day!';
  DBMS_OUTPUT.PUT_LINE('3rd Sunday in June is :
   '|| v_event );
   v_event  := q'[Mother's day]';
  DBMS_OUTPUT.PUT_LINE('2nd Sunday in May is :
   '|| v_event );
END;
/
```

```
anonymous block completed
3rd Sunday in June is : Father's day
2nd Sunday in May is : Mother's day
```

# Types of Variables

- PL/SQL variables:
  - Scalar
  - Composite
  - Reference
  - Large object (LOB)
- Non-PL/SQL variables: Bind variables

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# Types of Variables

TRUE

25-JAN-01

**Snow White**

Long, long ago,
in a land far, far away,
there lived a princess called
Snow White. . .

256120.08

Atlanta

# Guidelines for Declaring and Initializing PL/SQL Variables

- Follow naming conventions.
- Use meaningful identifiers for variables.
- Initialize variables designated as `NOT NULL` and `CONSTANT`.
- Initialize variables with the assignment operator (:=) or the `DEFAULT` keyword:

```
v_myName VARCHAR2(20):='John';
```

```
v_myName VARCHAR2(20) DEFAULT 'John';
```

- Declare one identifier per line for better readability and code maintenance.

# Guidelines for Declaring PL/SQL Variables

- Avoid using column names as identifiers.

```
DECLARE
  employee_id  NUMBER(6);
BEGIN
  SELECT     employee_id
  INTO       employee_id
  FROM       employees
  WHERE      last_name = 'Kochhar';
END;
/
```

- Use the `NOT NULL` constraint when the variable must hold a value.

# Scalar Data Types

- Hold a single value
- Have no internal components

TRUE

25-JAN-01

The soul of the lazy man desires, and he has nothing; but the soul of the diligent shall be made rich.

256120.08

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# Base Scalar Data Types

- CHAR [(maximum_length)]
- VARCHAR2 (maximum_length)
- NUMBER [(precision, scale)]
- BINARY_INTEGER
- PLS_INTEGER
- BOOLEAN
- BINARY_FLOAT
- BINARY_DOUBLE

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# Base Scalar Data Types

- DATE
- TIMESTAMP
- TIMESTAMP WITH TIME ZONE
- TIMESTAMP WITH LOCAL TIME ZONE
- INTERVAL YEAR TO MONTH
- INTERVAL DAY TO SECOND

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# Declaring Scalar Variables

Examples:

```
DECLARE
  v_emp_job          VARCHAR2(9);
  v_count_loop       BINARY_INTEGER := 0;
  v_dept_total_sal   NUMBER(9,2) := 0;
  v_orderdate        DATE := SYSDATE + 7;
  c_tax_rate         CONSTANT NUMBER(3,2) := 8.25;
  v_valid            BOOLEAN NOT NULL := TRUE;
  ...
```

# %TYPE Attribute

- Is used to declare a variable according to:
  - A database column definition
  - Another declared variable
- Is prefixed with:
  - The database table and column names
  - The name of the declared variable

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# Declaring Variables with the %TYPE Attribute

Syntax

```
identifier     table.column_name%TYPE;
```

Examples

```
...
  emp_lname      employees.last_name%TYPE;
...
```

```
...
  balance        NUMBER(7,2);
  min_balance    balance%TYPE := 1000;
...
```

# Declaring Boolean Variables

- Only the `TRUE`, `FALSE`, and `NULL` values can be assigned to a Boolean variable.
- Conditional expressions use the logical operators `AND` and `OR` and the unary operator `NOT` to check the variable values.
- The variables always yield `TRUE`, `FALSE`, or `NULL`.
- Arithmetic, character, and date expressions can be used to return a Boolean value.

# Bind Variables

Bind variables are:

- Created in the environment
- Also called *host* variables
- Created with the `VARIABLE` keyword
- Used in SQL statements and PL/SQL blocks
- Accessed even after the PL/SQL block is executed
- Referenced with a preceding colon

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# Printing Bind Variables

Example:

```
VARIABLE b_emp_salary NUMBER
BEGIN
   SELECT salary  INTO :b_emp_salary
   FROM  employees WHERE employee_id = 178;
END;
/
PRINT b_emp_salary
SELECT first_name, last_name FROM employees
WHERE salary=:b_emp_salary;
```

# Printing Bind Variables

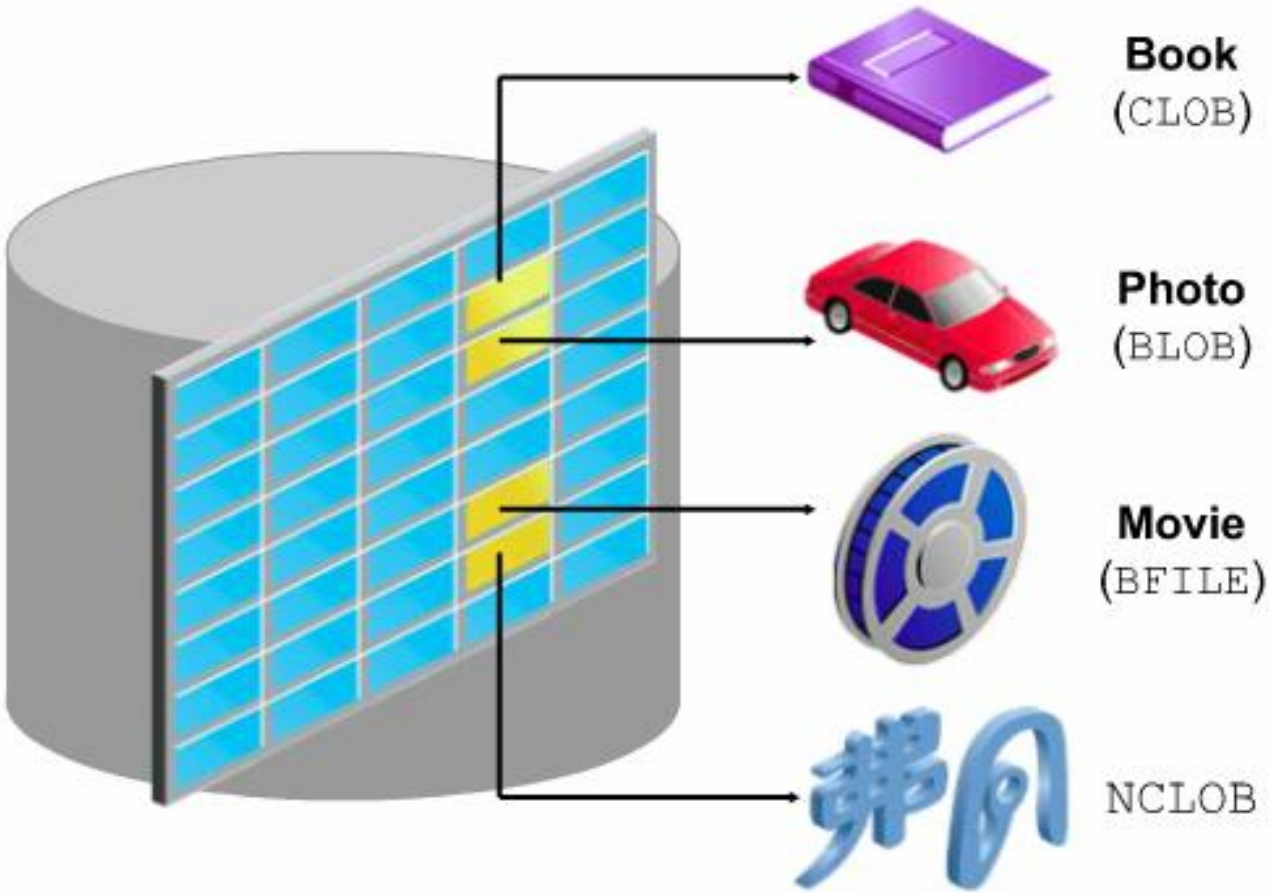
Example:

```
VARIABLE b_emp_salary NUMBER
SET AUTOPRINT ON
DECLARE
  v_empno NUMBER(6):=&empno;
BEGIN
   SELECT salary  INTO :b_emp_salary
   FROM  employees WHERE employee_id = v_empno;
END;
```

Output:

```
7000
```

# LOB Data Type Variables



# Composite Data Types

| | | | |
|---|---|---|---|
| TRUE | 23-DEC-98 | ATLANTA |  |

**PL/SQL table structure**

| | |
|---|---|
| 1 | SMITH |
| 2 | JONES |
| 3 | NANCY |
| 4 | TIM |

VARCHAR2

PLS_INTEGER

**PL/SQL table structure**

| | |
|---|---|
| 1 | 5000 |
| 2 | 2345 |
| 3 | 12 |
| 4 | 3456 |

NUMBER

PLS_INTEGER

# Quiz

The `%TYPE` attribute:

1. Is used to declare a variable according to a database column definition
2. Is used to declare a variable according to a collection of columns in a database table or view
3. Is used to declare a variable according the definition of another declared variable
4. Is prefixed with the database table and column names or the name of the declared variable

# Summary

In this lesson, you should have learned how to:

- Recognize valid and invalid identifiers
- Declare variables in the declarative section of a PL/SQL block
- Initialize variables and use them in the executable section
- Differentiate between scalar and composite data types
- Use the `%TYPE` attribute
- Use bind variables

# Practice 2: Overview

This practice covers the following topics:

- Determining valid identifiers
- Determining valid variable declarations
- Declaring variables within an anonymous block
- Using the `%TYPE` attribute to declare variables
- Declaring and printing a bind variable
- Executing a PL/SQL block

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